United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

A FAST-MOTION SIFTING MACHINE 1/

By Oscar G. Bacon
Division of Fruit Insect Investigations

The fast-motion sifting machine here described is adapted to the violent agitation of light-weight samples of infested materials. It was designed and used for removing insects and their eggs from approximately 2-pound samples of raisins. The screen was made to hold a sample of that weight spread 1 raisin deep. Over 1,000 sample examinations have been made with the machine without need for repairs or replacements.

As shown in figure 1, the apparatus consisted of an electric motor, a power-transmission assembly, and a swinging screen and its supporting frame.

Power was furnished by a 1/4-horsepower motor rated at 1,750 r.p.m., and fitted with a 1-1/2" V pulley. It operated the sifter, loaded or empty, at a speed of 363 round trips per minute, or about 6 per second, with a lateral movement of 4-1/2 inches. Connecting the motor pulley with the drive-shaft pulley was a V belt 39-3/4" long.

The transmission unit was made by fitting an 8" V pulley to the center of a 12-3/4" piece of 1/2" steel shafting. Two face plates 3-1/2" in diameter were fastened at the ends of the shafting, which rested in two bronze bearings. The shaft was centered between the bearings by means of two 1/2" collars. The bearings, of the adjustable type, were extended so that the center of the bearing hole was 3-1/8" from the bottom surface of the metal base. They were mounted on wooden blocks 3-5/8" high, 1-3/4" wide, and 8-3/8" long.

1/ Other power-driven sifters have been described by R. E. Campbell and M. W. Stone, Soil sifters for subterranean insects, Cir. ET-49, 1935; by M. C. Lane and F. H. Shirck, A mobile power soil sifter, Cir. ET-70, 1936; by Ralph W. Bunn and W. C. McDuffie, A shaker and modified Berlese funnel for extracting alfalfa weevils from baled hay, Cir. ET-108, 1937; by C. M. Gjullin, A machine for separating mosquito eggs from soil, Cir. ET-135, 1938; by A. W. Morrill, Jr., A sturdy but compact soil sifter for field use, Cir. ET-148, 1939; and by F. W. Carlson and M. A. Yothers, A power-driven soil-sifting machine, Cir. ET-181, 1941.

The blocks were bolted to a 1" x 12" x 22" wooden base. The motor was bolted to the same base, so that the power and transmission were assembled as a unit on one support. Four carriage bolts secured the base to a heavy supporting stand.

Eccentrics were made from blocks of oak 1" x 2-3/4" and 4-3/4" long, cut to the shape shown in figure 1. The end holding the crank pin was left a full inch in thickness. One and one-half inches in from this end a saw cut 3/8" deep was made and a piece of that thickness was split out, leaving the remainder of the block 5/8" in thickness to provide clearance for the connecting rods. The eccentrics were fastened to the face plates by three 1/4" flat-headed stove bolts 1-1/4" long, countersunk in the wood.

Connecting rods of hard, straight-grained gum wood were made 8-1/4" long and 3/4" square. One end of each rod was fastened to the oak eccentric by means of a crank pin made of a 5/16" machine bolt 2-1/8" long, threaded to within 1" of the head. The pins were screwed into holes bored in the eccentrics 2-1/4" out from the center of the face plates. At the other end the connecting rods were attached to the frame holding the screen by means of 1" hinges.

With the light loads handled, the wooden connecting-rod bearings gave no trouble from heating or wear. The wood was hard, and the bearings were kept oiled. Ball bearings and more durable crank pins would be preferable where more severe conditions are to be met.

A frame from which to suspend the moving screen was made with four legs 29" high of 1" x 4" white pine stock, tapered to a width of 2-1/2" at the bottom. At the corners on the side opposite the operator, where room for removing the screen was not needed, two of the legs were doubled, with the members at right angles to one another. At the top the legs were screwed to a frame 21-3/4" x 27-1/2", using 10-gauge screws 1-1/2" long. The legs were secured to the supporting stand by iron angles. For added rigidity, the cross members of the top frame were set in from the ends of the side members a distance of 4-3/4" and were braced with triangular wooden corner pieces.

A black iron baking or drip pan with the bottom replaced by a wire cloth of 6 meshes per inch, leaving a narrow edge all around, was used for the screen. A wire-cloth lid, hinged near the middle, prevented the raisins from being thrown out. This screen, 17-7/8" x 19" by 2-1/2" deep, was removably set in a wooden frame of 1" x 4" white pine built to hold it snugly. The frame was suspended by four strips of oiled oak, 1-1/2" x 1/8" and 17-1/2" long. They were each fastened rigidly at the top with four round-headed screws, two of which passed first through a metal plate 1" x 1-1/2" by 1/8" thick to reinforce the attachment of the oak hangers. The lower ends of the strips were fastened to the screen frame by 1" hinges which were attached to the strips by 5/8" stove bolts passed through a metal plate 1-1/2" x 1", for added strength. The other leaves of the hinges were screwed to the screen frame.

Beneath the screen, a while enamel developing pan, 20" x 24", was used to catch the siftings, the pan being raised on guides to hold it near the bottom of the screen. Referring to the illustration, there was room for the removal of the screen to the right, while the pan was withdrawn on the side opposite the motor. A switch between the motor and a wall plug was provided for convenient starting and stopping.

The cost of the sifter, not including labor or the cost of the stand, was about as follows: Lumber, $3.00; shaft, bearings collars, pulleys, face plates, and belt, $7.76; miscellaneous hardware, $2.29; trash pan, $4.17; motor, $6.45; total $23.67.

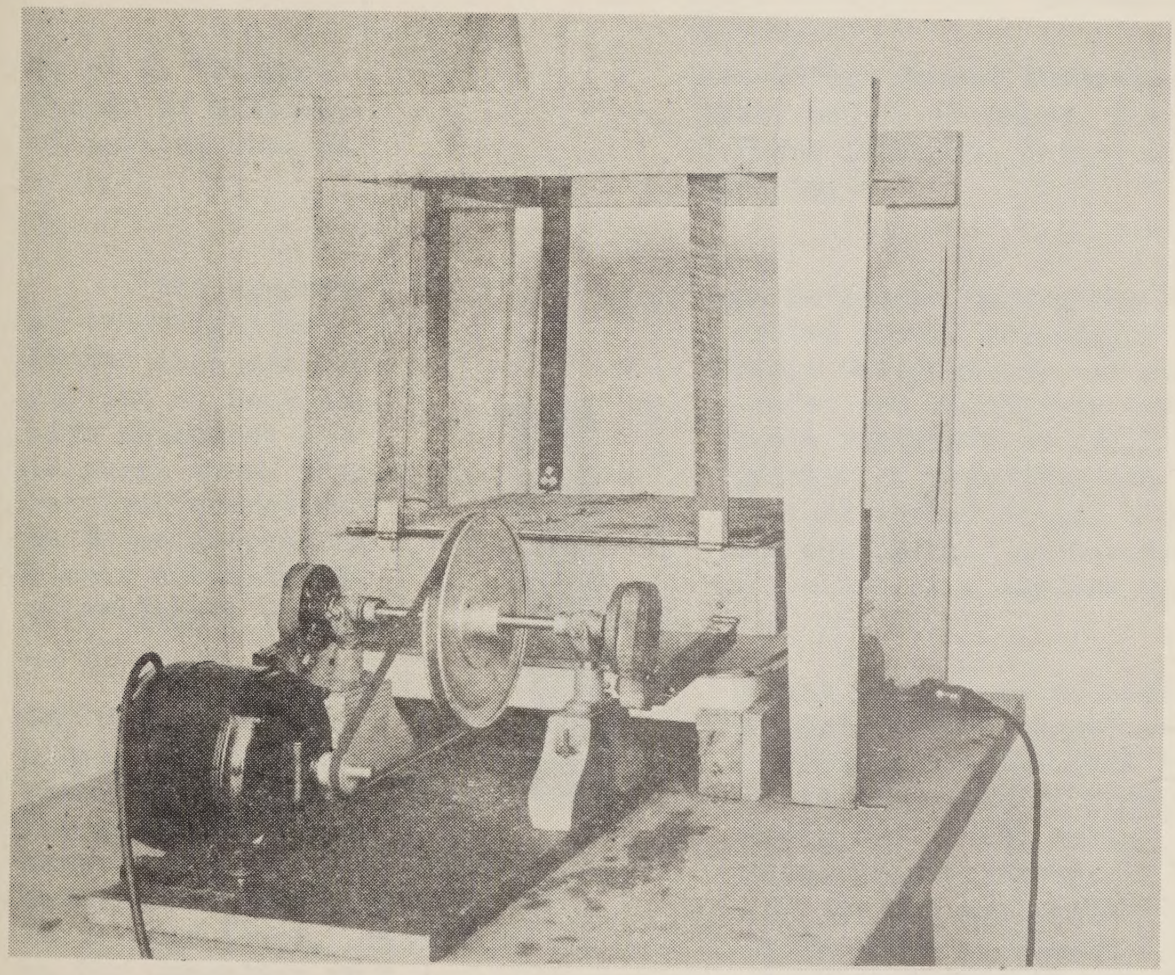

Figure 1.—Fast-motion sifting machine mounted on heavy stand.